The United States' Experience: Resolving Oil Pollution Liability with Restoration-Based Claims

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Presentation Outline

I. The U.S. Oil Pollution Act of 1990

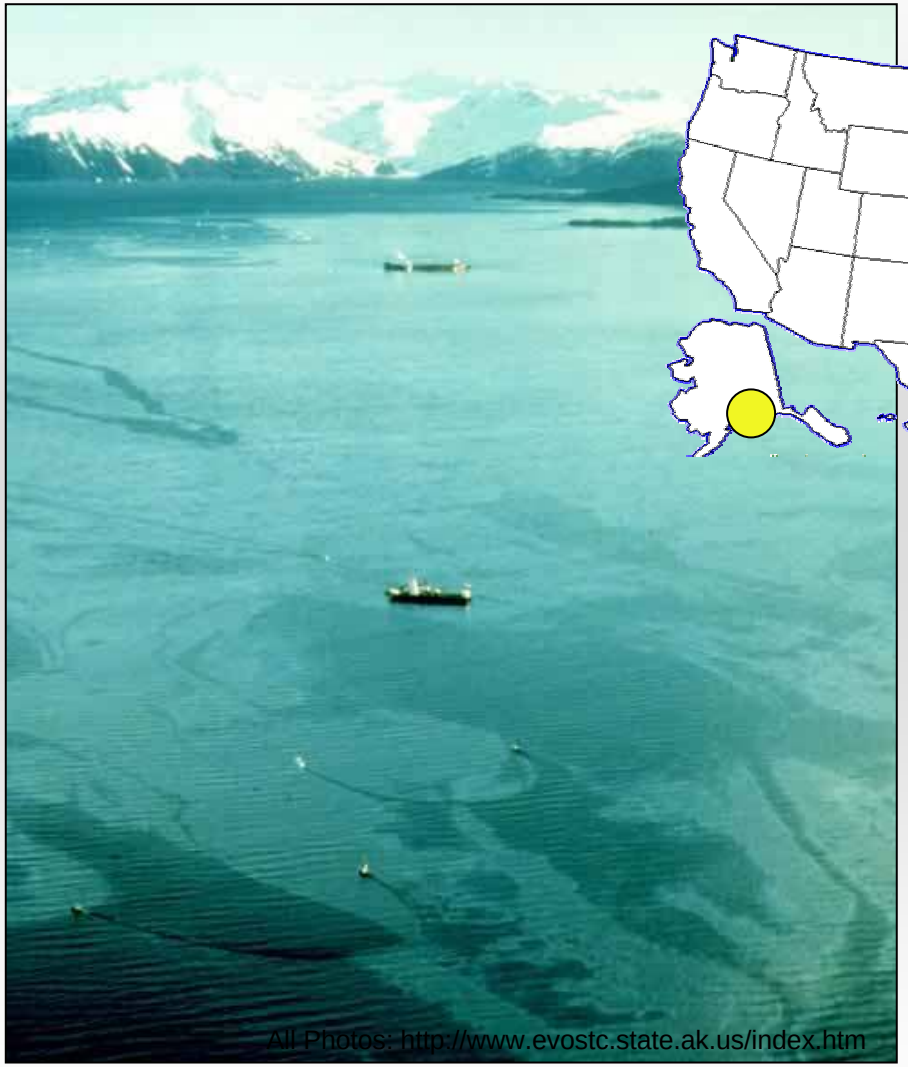
II. Restoration Scaling Alternatives

III. Habitat Equivalency Analysis

IV. Case Example: T/V*Westchester* Oil Spill


T/V Westchester

Exxon Valdez Oil Spill, Alaska



All Photos: http://www.evostc.state.ak.us/index.htm

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U.S. Oil Pollution Act (OPA)

- Enacted in 1990 in response to*Exxon Valdez*
- Outlines liability from vessels, onshore facilities, & offshore facilities
- Liability for damages & removal costs for both an actual discharge & threat of a discharge
- Increased Oil Spill Liability Trust Fund limit
- Issued natural resource damage assessment (NRDA) implementing regulations in 1996

OPA NRDA

- Goal: make the environment & public whole for injuries to resources & services

- How?
  - Primary Restoration: return injured resources/services to baseline conditions
  - Compensatory Restoration: provide additional resources/services to offset interim and perpetual losses

OPA Compensatory Restoration

- Must restore, rehabilitate, replace, or acquire resources/services equivalent to those that were lost

- Preference for options that provide resources/services of the same type, quality, & of comparable value

- Hierarchy of scaling methods

Restoration Scaling

- Scaling: the process of determining how much restoration is required to make the environment and public whole

- Scaling Methods:
  1. Service-to-Service
  2. Value-to-Value
  3. Value-to-Cost

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1. Service-to-Service Scaling

Service **Losses** due to Primary Injury

Discounted, in **Service** Units

=

Service **Gains** from Compensatory Restoration

Discounted, in **Service** Units

- Use when injured and restored resources are the same or similar
- Example: saltmarsh is injured & saltmarsh is the compensatory restoration habitat

2. Value-to-Value Scaling

Value of Service **Losses** due to Primary Injury

Discounted, in **$$$** Units

=

Value of Service **Gains** from Compensatory Restoration

Discounted, in **$$$** Units

- Preferred when service-to-service is not applicable
- Very rarely used because it requires 2 valuation exercises (costly & lengthy)

3. Value-to-Cost Scaling

Value of Service **Losses** due to Primary Injury

Discounted, in **$$$** Units

=

Cost of Compensatory Restoration

Discounted, in **$$$** Units

- Least preferred scaling method
- Often used for lost human use of resources (fishing, hunting, beach use)

Habitat Equivalency Analysis (HEA)

- Service-to-Service method to scale compensatory restoration projects to “replace” interim service losses
- Yields a physical quantity of restoration required - does not involve €
- Can be used in cost-effectiveness decision making when there are several restoration options

Habitat Equivalency Analysis (HEA)

If € are not the units, what is used?

- Most habitats provide a complex suite of services, so choosing just one is difficult
- The most common unit is…

Discounted Service-Hectare-Years

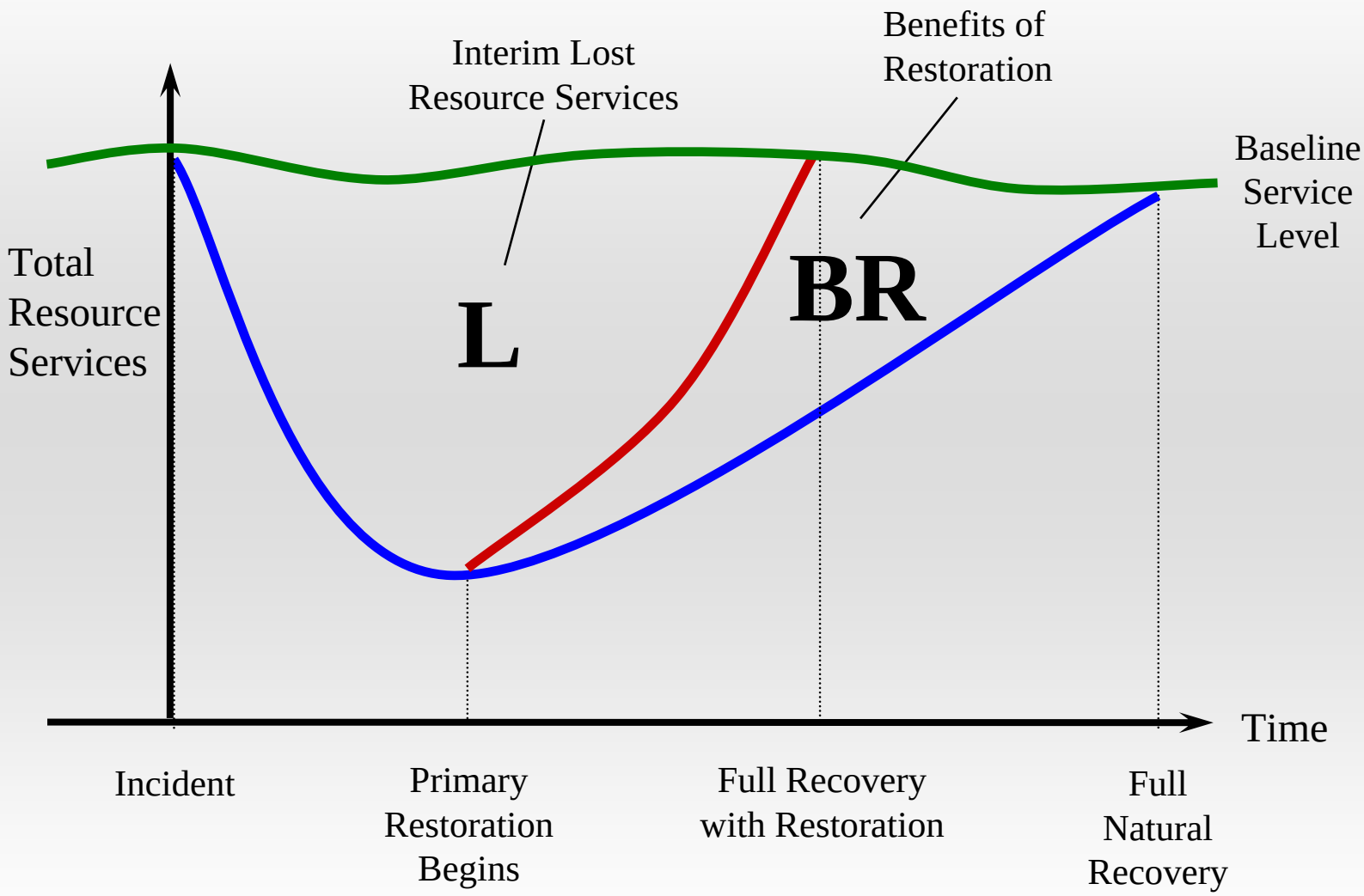
A euro today is not worth a euro tomorrow- same for environmental services

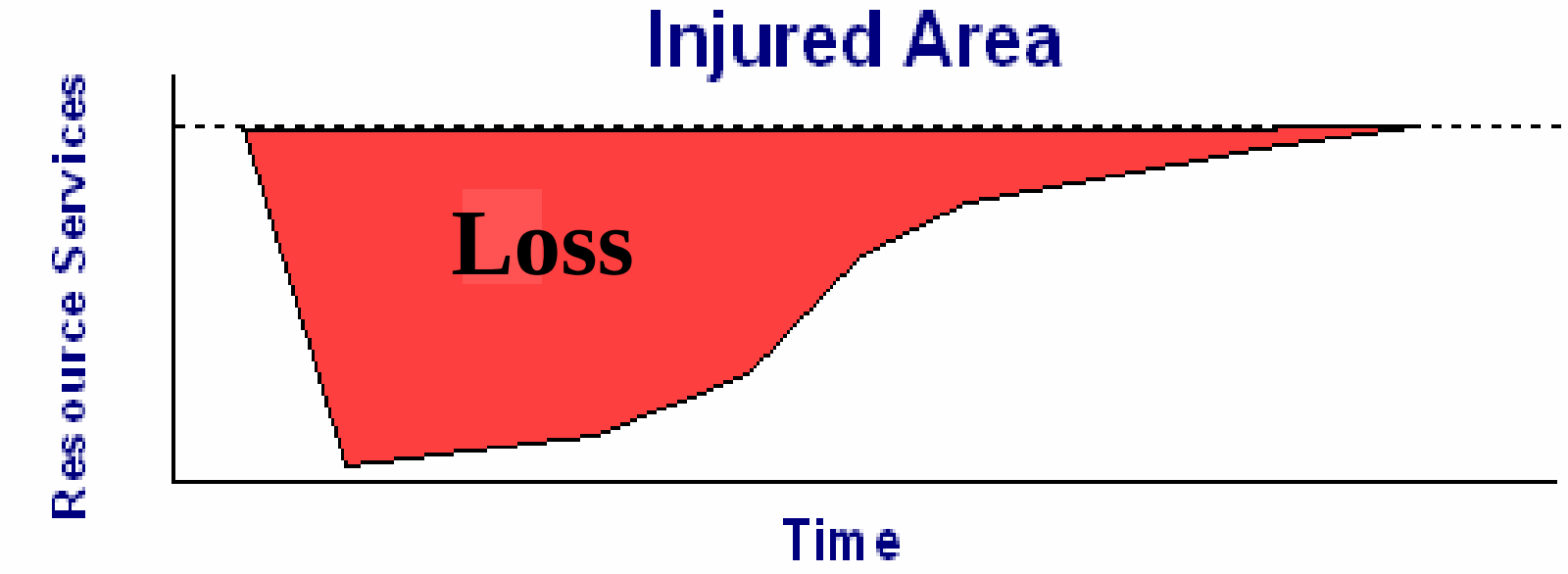
All of the complex goods provided by the habitat

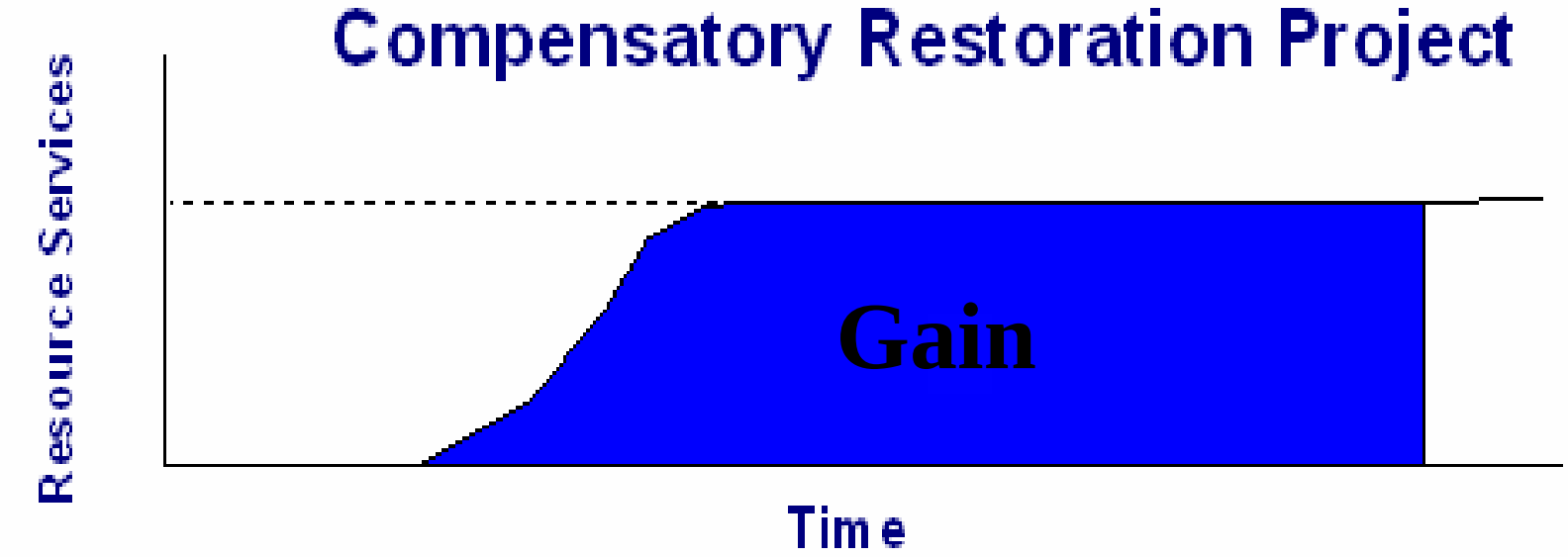
Physical area measurement

Measure of time

Primary Restoration and Interim Losses



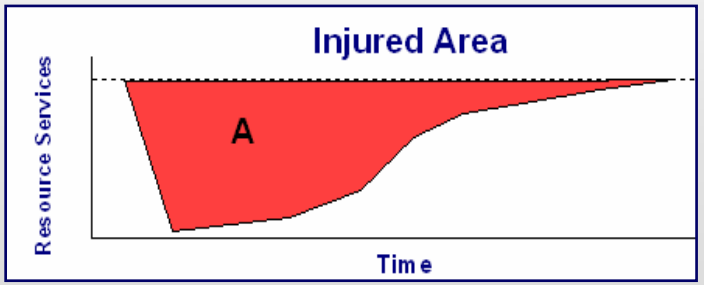

Injured Area
Resource Services
Loss
Time


Compensatory Restoration Project
Resource Services
Gain
Time

Basic HEA Steps

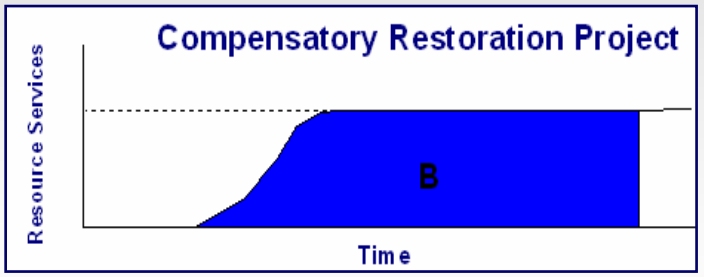
A. The Injury:

1. Quantify the injury losses
2. Estimate the recovery function
3. Sum the discounted losses



B. The Compensatory Project:

4. Quantify the benefits of 1 hectare
5. Estimate the service provision function
6. Sum the discounted benefits
7. Divide #3 by #6



T/V *Westchester* Oil Spill, Louisiana

T/V *Westchester* Oil Spill, Louisiana

T/V *Westchester* Oil Spill Basics

- Incident: 28 Nov 2000
- Location: Mississippi River, South of New Orleans, Louisiana
- Release: 13,095 bbl Nigerian crude
- Vessel lost steerage, dropped anchor, ran over anchor, and punctured tank
- Very favorable oil recovery conditions

T/V *Westchester* Oil Spill Injuries

A. Habitat:
   1. Freshwater Vegetation
   2. Delta Marsh
   3. Rip-Rap
   4. Sandflats

B. Resources:
   1. Various Birds
   2. Finfish and Shellfish

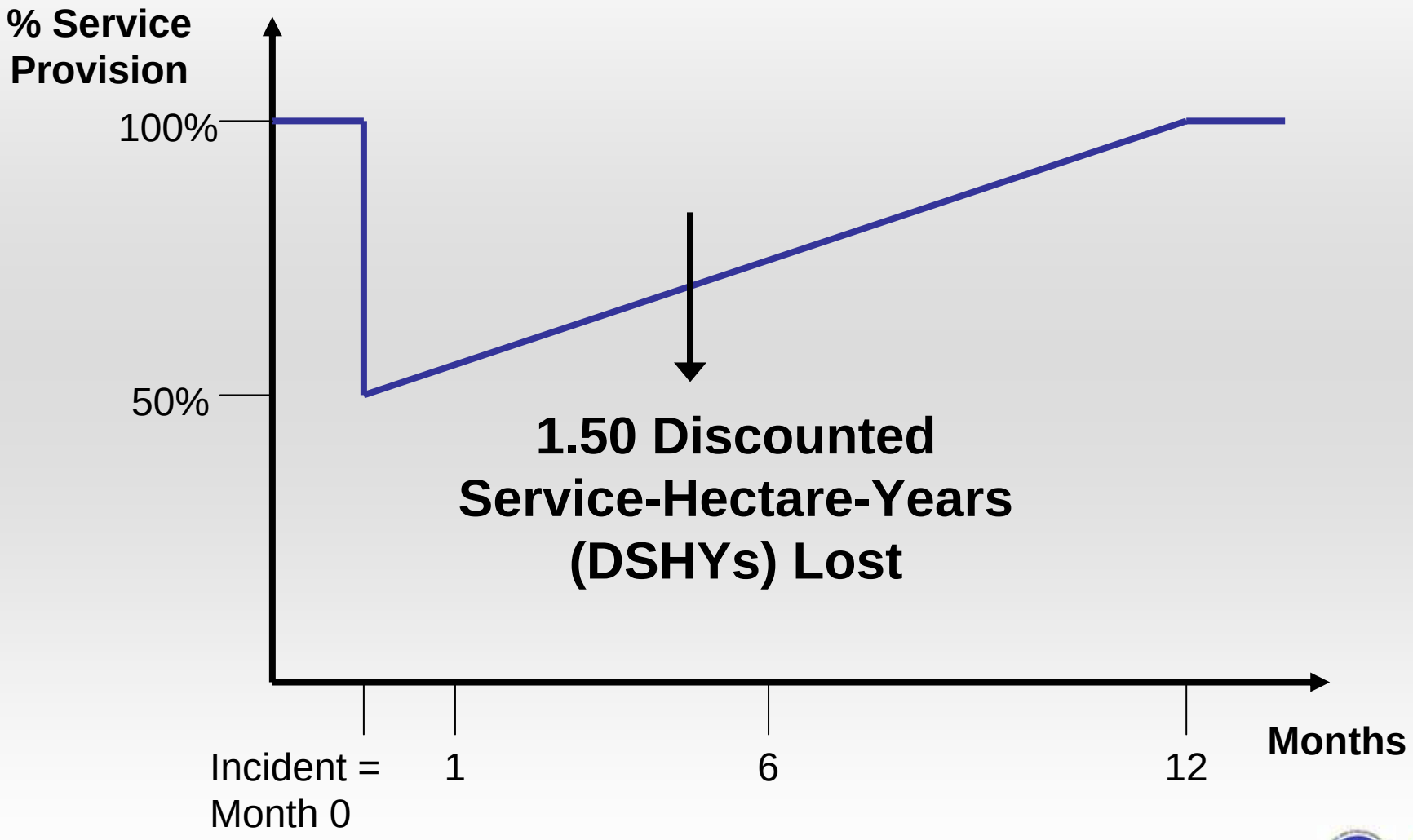
C. Lost Recreational Use:
   1. Fishing
   2. Hunting

1. Freshwater Vegetation Injury

1. Freshwater Vegetation Injury

- 6.8 ha total heavily oiled
  - 6.2 ha vegetated mudflat
  - 0.2 ha vegetated bank
  - 0.4 ha fresh marsh
- 50% initial service loss
- Full recovery in 12 months

1. Freshwater Vegetation Injury

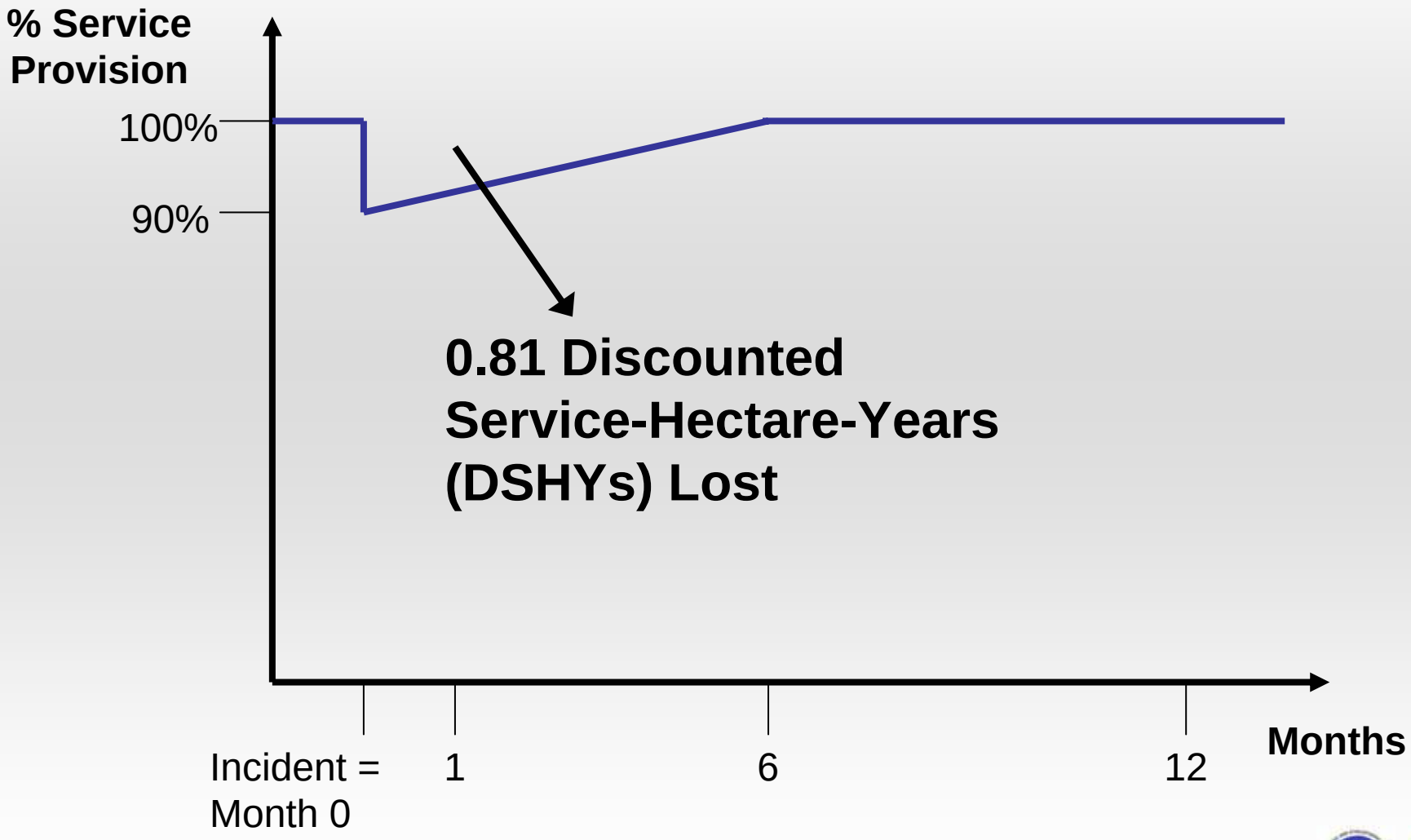


2. Delta Marsh Injury

2. Delta Marsh Injury

- 40.5 ha marsh sheened
- Very little injury- some invertebrate mortality, no vegetation morality
- 10% initial service loss
- Full recovery in 6 months

2. Delta Marsh Injury

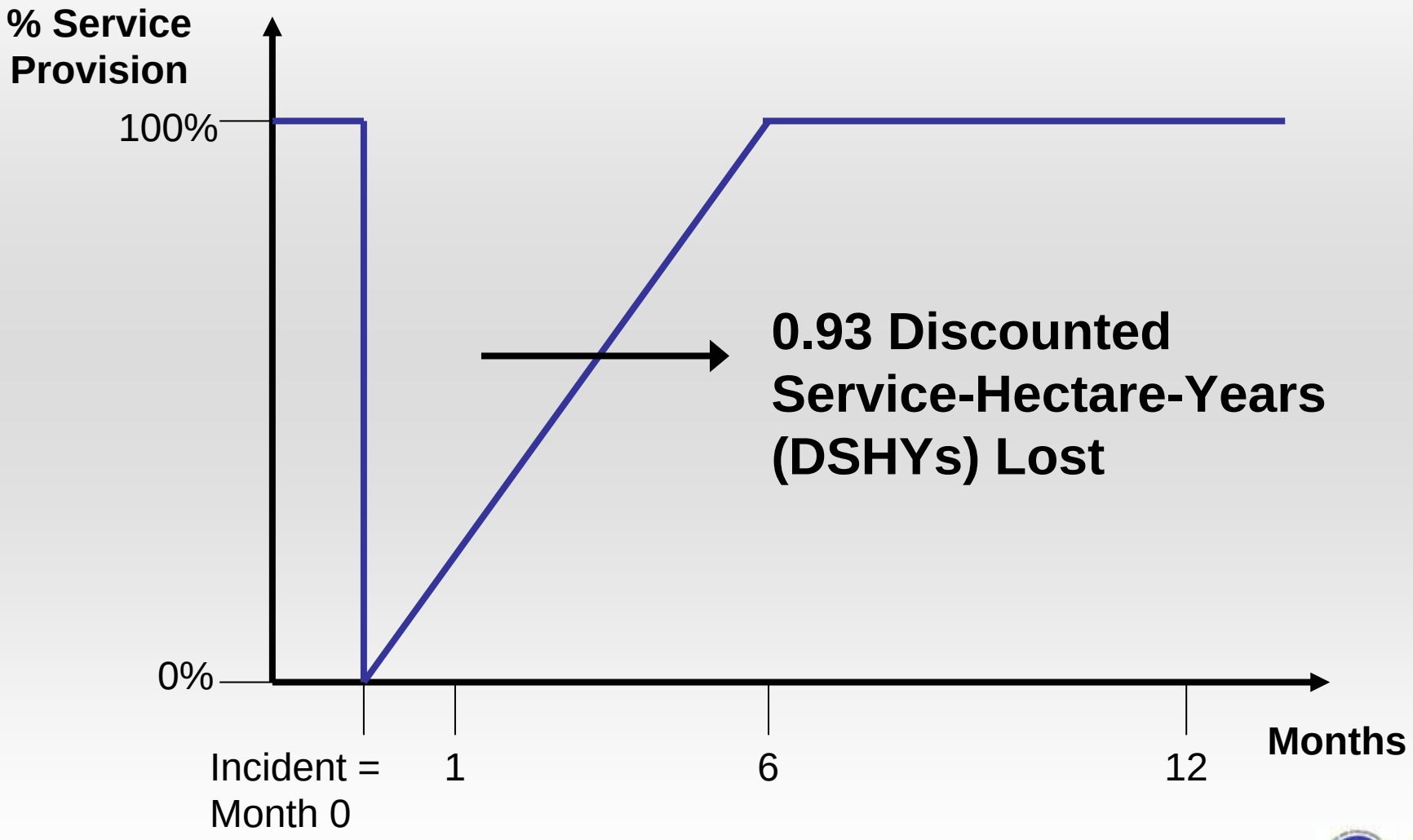


3. Rip-Rap Injury

3. Rip-Rap Injury

- 4.5 ha injured
- 100% initial service loss
- Full recovery in 6 months

3. Rip Rap Injury

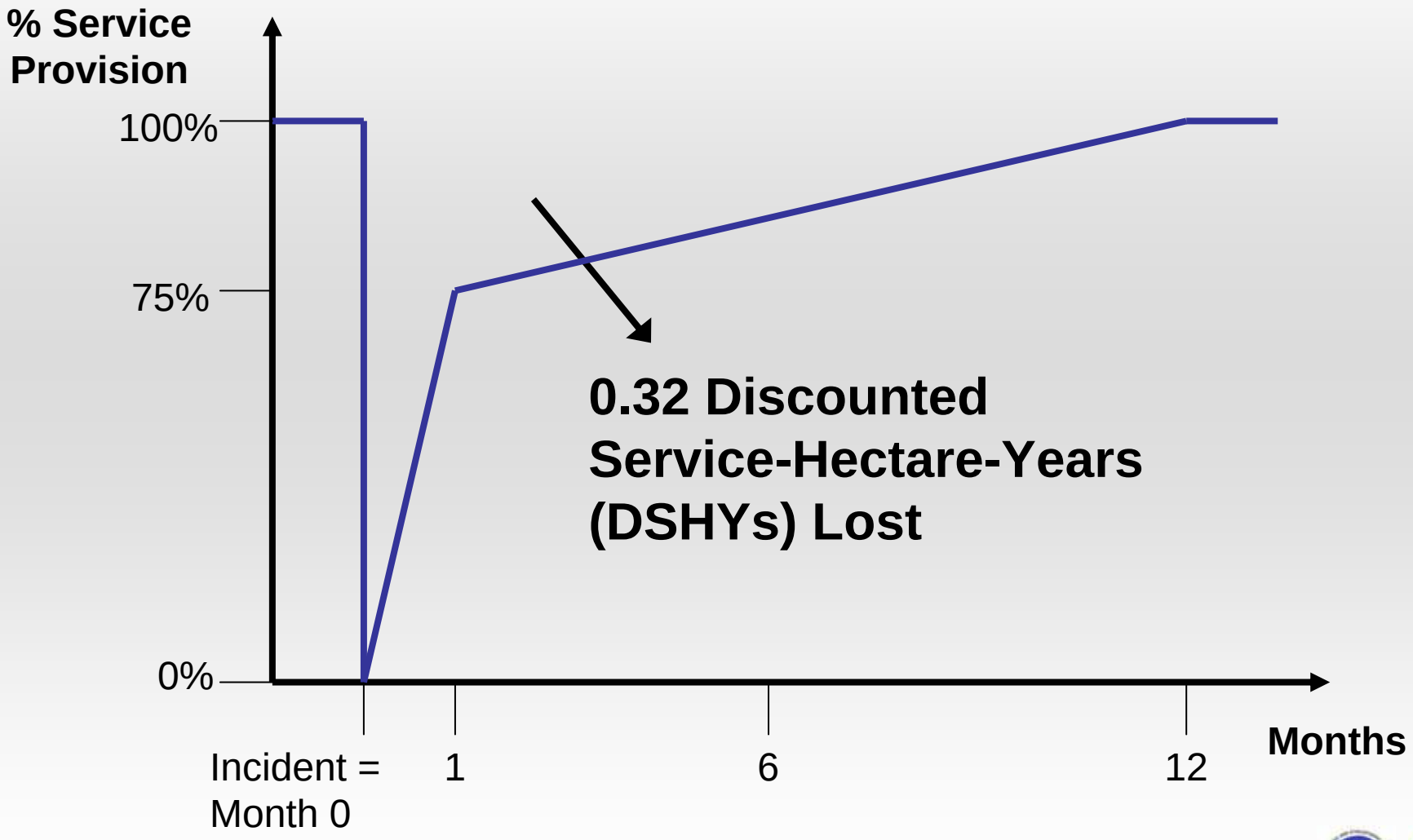


4. Sand Flat Injury

4. Sand Flat Injury

- 2.9 ha heavily oiled
- 100% initial service loss
- Recovery to 75% service in 1 month
- Full recovery in 12 months

4. Sand Flat Injury



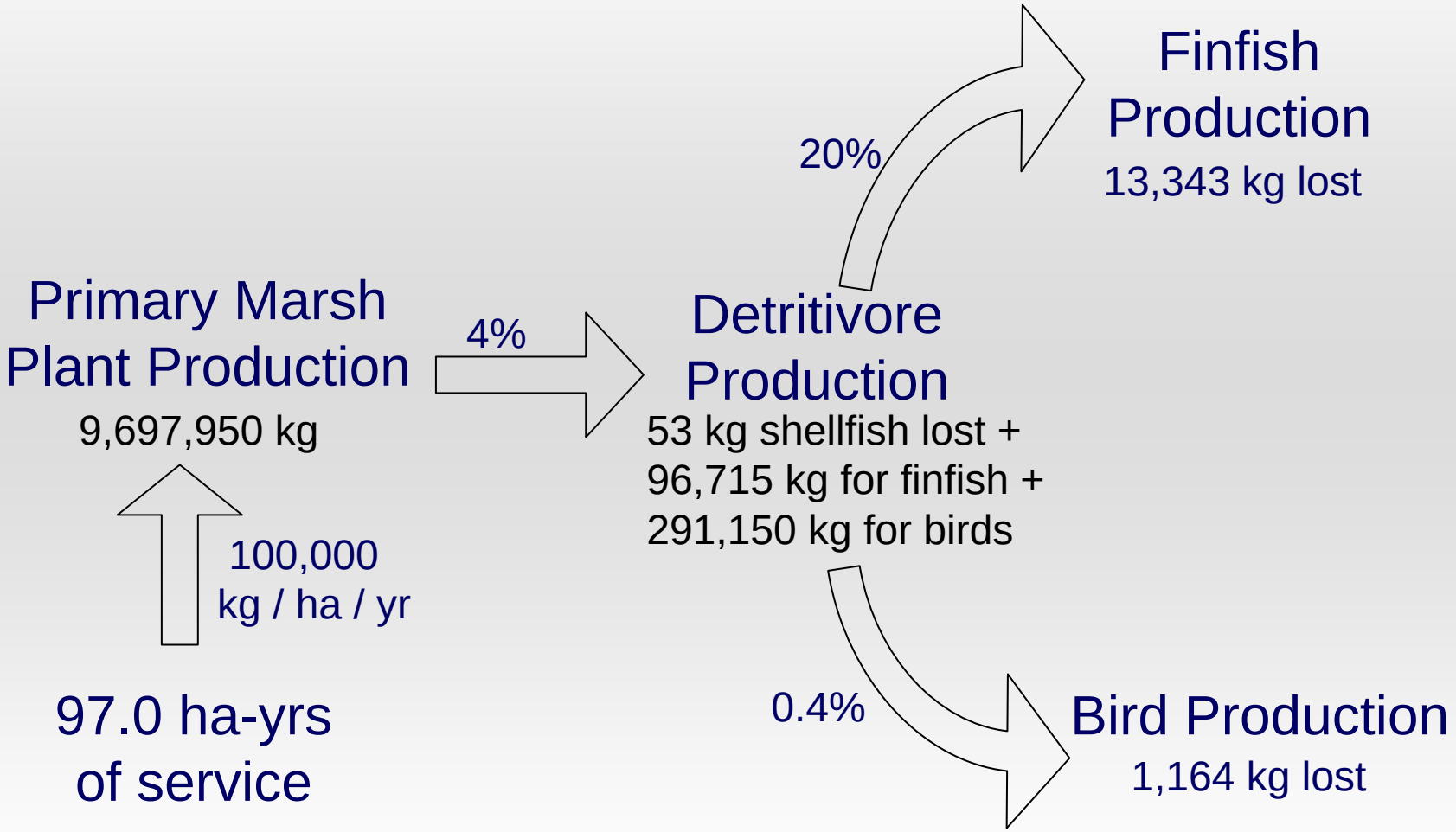
Bird Injury

- 117 oiled birds observed
- 14 birds brought for rehabilitation
  - 10 died
  - 4 released alive
- 5 collected dead
- Model estimate: 582 total lost (1,164 kg)

Finfish & Shellfish Injury

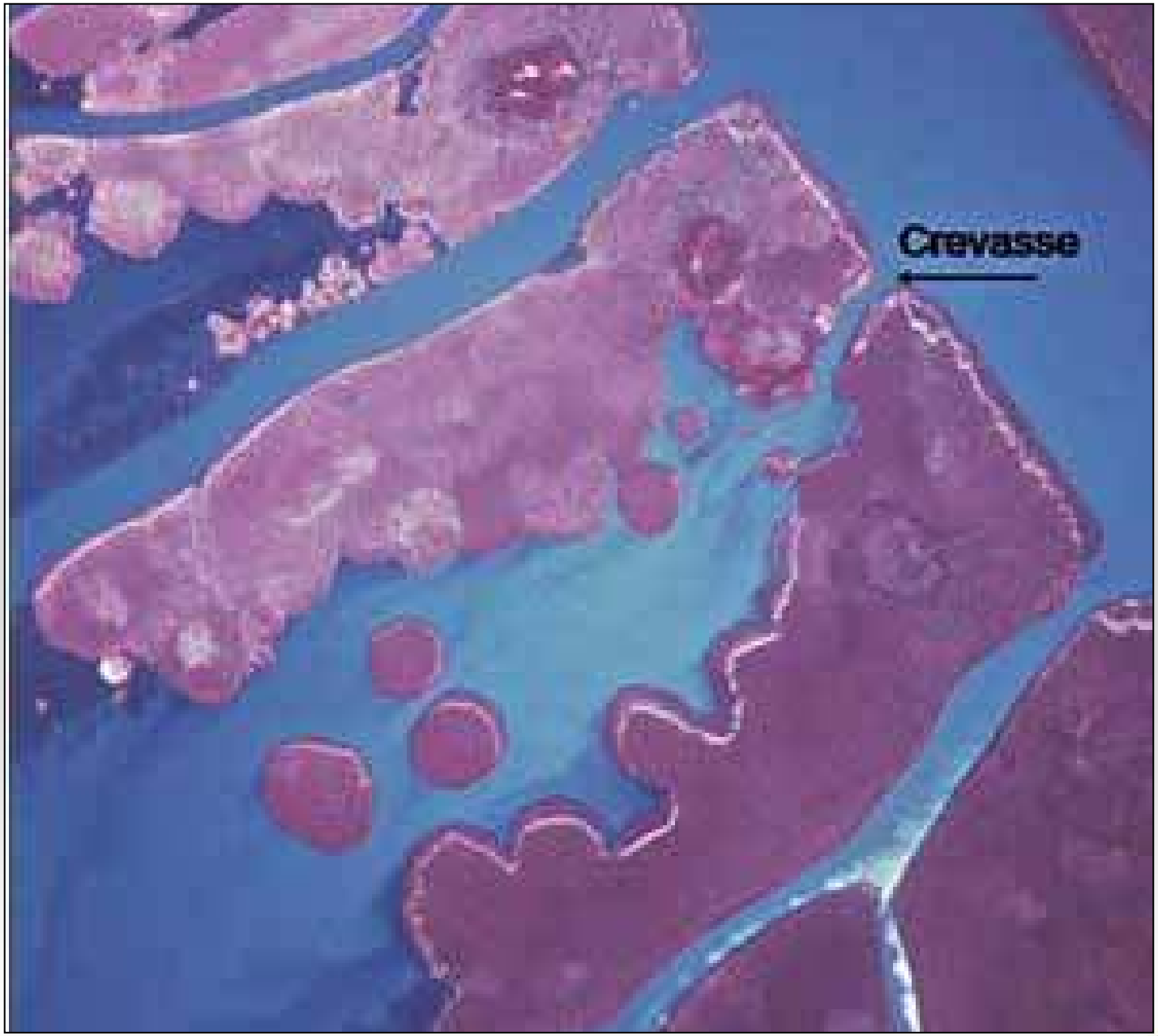
- Few dead fish collected
- Modeling Fish Loss:
  - Chemical/Hydrodynamic model to predict oil path
  - Biological abundance model to predict species distribution
  - Estimated 13,400 kg fish/shellfish biomass lost

Using Trophic Transfer Efficiencies



Injury Summary

Injury	DSHYs Lost	Conversion Ratio	Splay Marsh DSHYs Lost
Freshwater Vegetation	1.50	1:1	1.50
Delta Marsh	0.81	1:1	0.81
Rip-Rap	0.93	10:1	0.09
Sand Flats	0.32	5:1	0.06
Birds & Fish	97.0	1:1	97.0
Total			**99.46**



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Crevasse Splay Marsh

- Silt-laden water velocity slows, depositing silt and forming a marsh
- Up to 40 ha can be formed in this location
- Required marsh growth rate to provide 99.46 DSHYs:
  - 0.62 ha of new marsh per year
  - Minimum of 9.3 ha of total marsh @ 15 years
- Selected project will likely overcompensate for injuries

Summary

- U.S. OPA NRDA specifies preference for in-kind restoration following injury
- Habitat Equivalency Analysis (HEA) is the service-to-service method used most often
  - Cost-effective
  - Permits sensitivity analysis (for uncertainty)
  - Driven by biological input parameters
- The measure of damages = cost of implementing restoration + assessment costs

Contact Information

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Recreational Loss Estimate

Recreational Loss Estimate

- River closed to vessel traffic for 2+ days
- During peak of waterfowl hunting season
- Many hunting/fishing camps only accessible by river
- Use historical survey data to estimate 655 lost fishing and 804 lost hunting trips
- Benefits Transfer for value of trip:
  - $38.41 to $62.30 per hunting trip
  - $40.17 to $109.88 per fishing trip
- Total loss estimate: $57,000 to $122,000

Recreation Compensatory Project

- Scaled using value-to-cost approach
- Construct a dock for recreational fishing to improve access
- Cost of the dock = value of lost recreation